**Topic 7 – Nucleic acids and proteins – Study Guide**

**7.1 DNA structure**

Can you describe the DNA structure? (including the antiparallel strands, 3’–5’ linkages and hydrogen bonding between purines and pyrimidines)

Can you explain what nucleosomes are? Do you know their importance?

Can you distinguish between *unique or single-copy genes* and *highly repetitive sequences* in nuclear DNA?

Do you know what introns and exons are?

**7.2 DNA replication**

Can you explain the process of DNA replication in prokaryotes, including the direction in which it occurs and the role of enzymes (helicase, DNA polymerase, RNA primase and DNA ligase), Okazaki fragments , deoxynucleoside triphosphates?

Can you differentiate DNA replication between prokaryotes and eukaryotes?

**7.3 Transcription**

Can you explain and identify what sense and antisense strands are?

Can you explain the process of transcription in prokaryotes, including the direction in which it occurs and the roles of the promoter region, RNA polymerase, nucleoside triphosphates and the terminator?

Do you know what happens to introns and exons during transcription?

**7.4 Translation**

Can you explain the role of the tRNA-activating enzyme during translation?

Can you describe the structure of ribosomes (including protein and RNA composition, large and small subunits, three tRNA binding sites and mRNA binding sites)?

Do you know the steps of DNA translation? Can you outline what happens during each one?

Can you draw and label a diagram showing the structure of a peptide bond between two amino acids?

Can you explain the process of translation (including ribosomes, polysomes, start codons and stop codons)?

Do you know the difference between free ribosomes and that bound ribosomes?

**7.5 Proteins**

Can you outline the four levels of protein structure and indicate the significance of each one?

Can you differentiate between fibrous and globular proteins? Can you give one example of each?

Do you know the significance of polar and non-polar amino acids?

Can you list the functions of proteins, giving a named example of each?

**7.6 Enzymes**

Do you know what metabolic pathways are?

Can you describe the induced-fit model?

Can you explain how enzymes speed up chemical reactions?

Can you differentiate between competitive and non-competitive inhibition? Can you give one example of each?

Do you know how end-product inhibition works? Can you outline the role of allosteric sites?